

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization  
International Bureau



(43) International Publication Date  
23 May 2002 (23.05.2002)

PCT

(10) International Publication Number  
WO 02/040317 A3

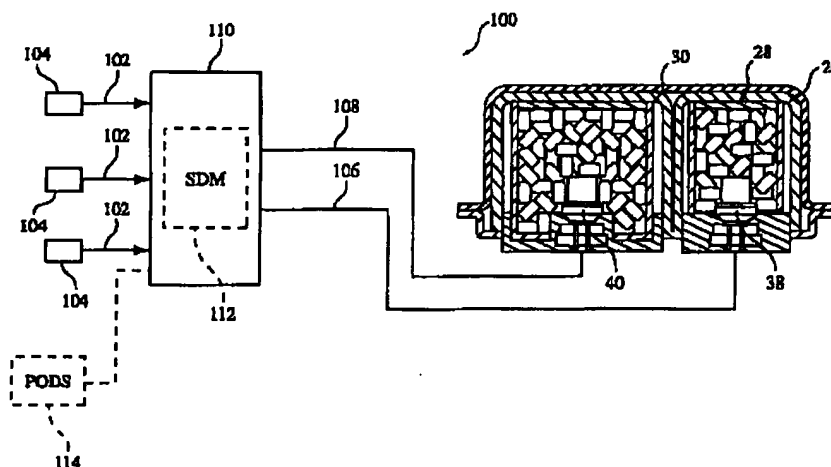
- (51) International Patent Classification<sup>7</sup>: B60R 21/26, (74) Agent: MARRA, Kathryn, A.; Delphi Technologies, Inc.,  
21/32 P.O. Box 5052, Mail Code: 480-414-420, Troy, MI 48007-  
5052 (US).
- (21) International Application Number: PCT/US01/44076 (81) Designated States (*national*): JP, KR.
- (22) International Filing Date: 6 November 2001 (06.11.2001) (84) Designated States (*regional*): European patent (AT, BE,  
CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC,  
NL, PT, SE, TR).
- (25) Filing Language: English
- (26) Publication Language: English Published:  
— with international search report
- (30) Priority Data: 60/248,997 15 November 2000 (15.11.2000) US (88) Date of publication of the international search report:  
09/949,702 10 September 2001 (10.09.2001) US 22 August 2002

(71) Applicant: DELPHI TECHNOLOGIES, INC.  
[US/US]; 5725 Delphi Drive, Troy, MI 48098-2815  
(US).

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(72) Inventors: YOON, Joseph, Y.; 3212 Lexham Lane,  
Rochester Hills, MI 48309 (US). LITTLE, David, R.;  
5420 Princeton Place, Kokomo, IN 46902 (US).

(54) Title: METHOD AND APPARATUS FOR DEPLOYMENT OF AN AIR BAG



(57) Abstract: A method and apparatus for controlling the deployment of a passive inflatable restraint system wherein driver and passenger air bags are employed. Each air bag has two independently actuatable gas generators (28,30) which are activated in a fixed time sequence. The sequence is timed to provide an initial low inflation rate to just open the air bag container and initially deploy the air bag followed by a higher gas flow rate to complete filling of the air bag. In response to signals from vehicle acceleration sensors (104), an electronic control unit (110) determines if impact severity warrants deployment of the air bag. If deployment is required, the control unit (110) provides a first signal (106) for activating a first initiator (38) and a second signal (108) for activating a second initiator (40), the second signal being delayed a predetermined time after the first signals is generated. A passive occupant detection system (114) identifies infants and small children and instructs the control unit (110) to suppress deployment of the air bag.

WO 02/040317 A3

# INTERNATIONAL SEARCH REPORT

International application No.

PCT/US01/44078

## B. FIELDS SEARCHED

Electronic data bases consulted (Name of data base and where practicable terms used):

### EAST

search terms: inflator, gas generator, dual stage, two stage, time delay, suppress, inhibit, deactivate, prevent, airbag, air bag, gas bag, sensor

11/17

BEST AVAILABLE COPY

FIG. 12

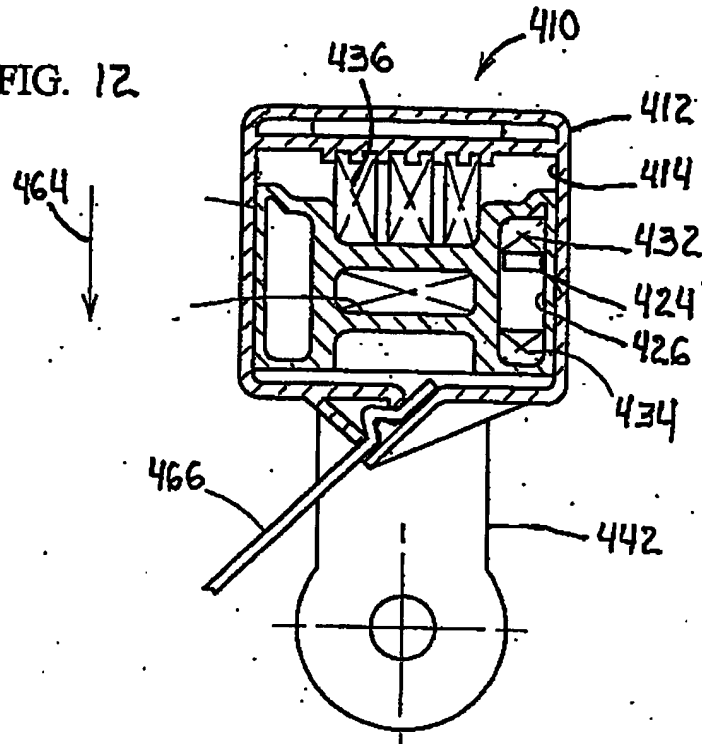
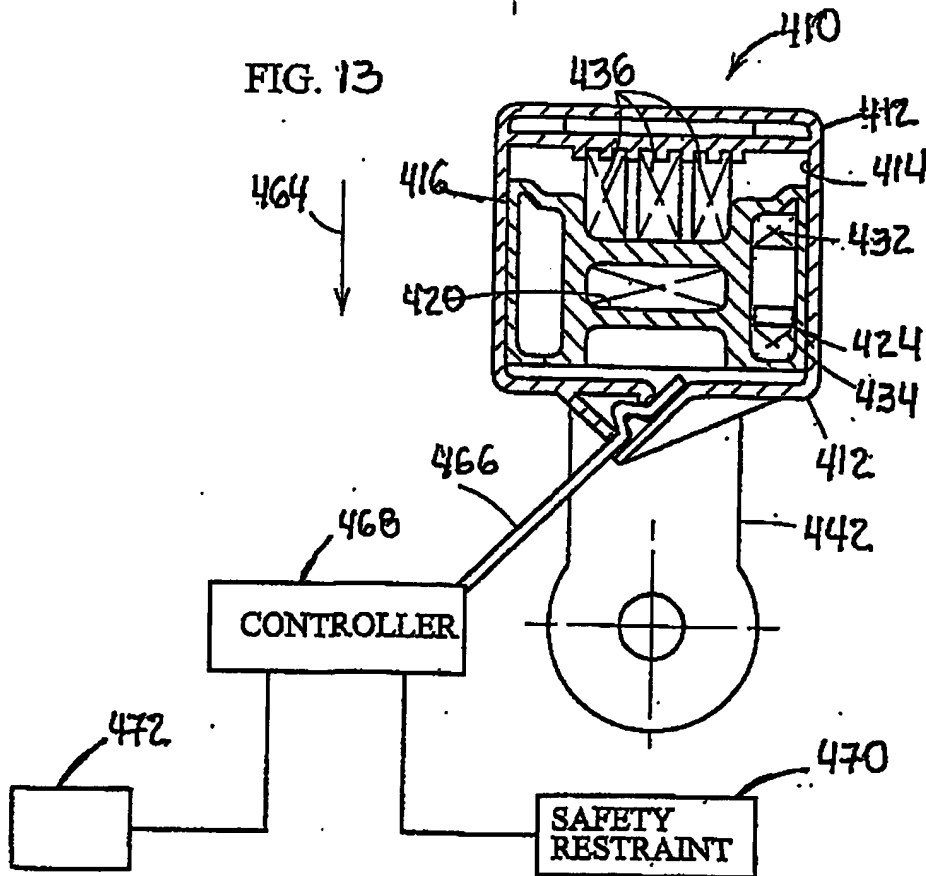


FIG. 13



12/17

FIG. 14

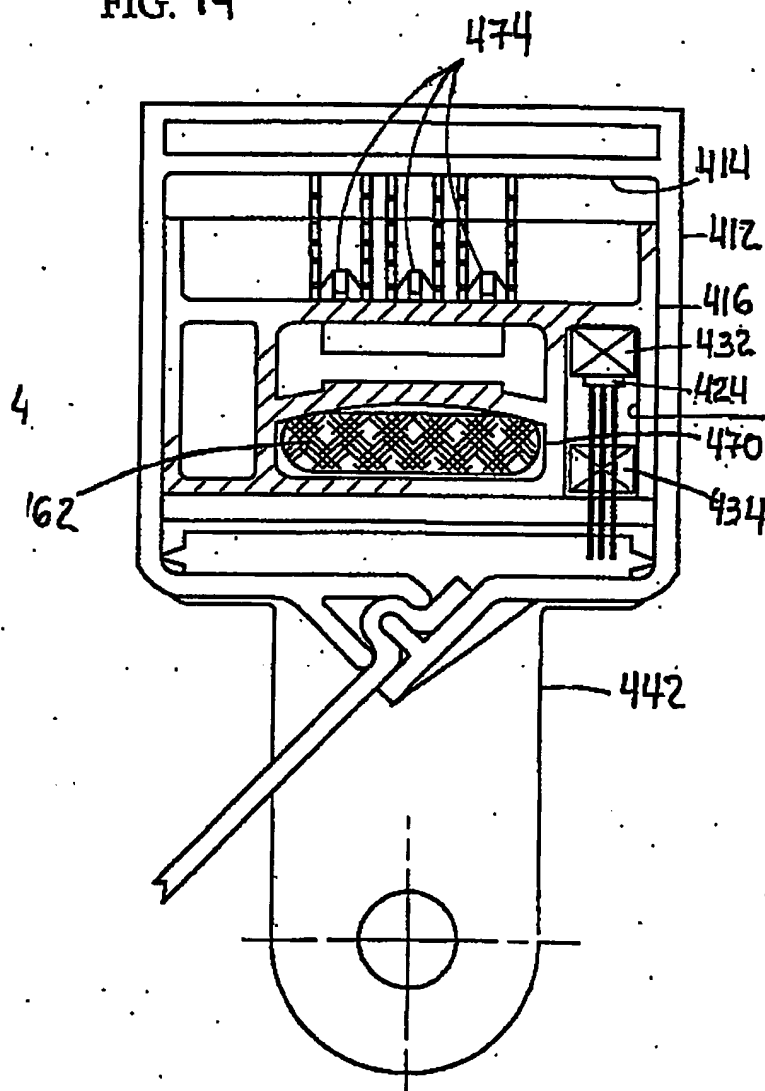
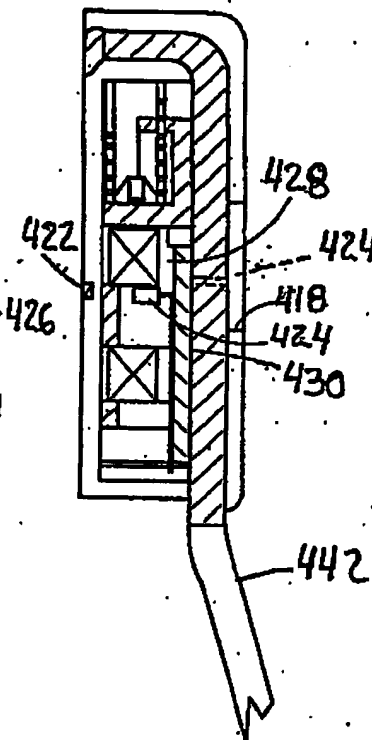
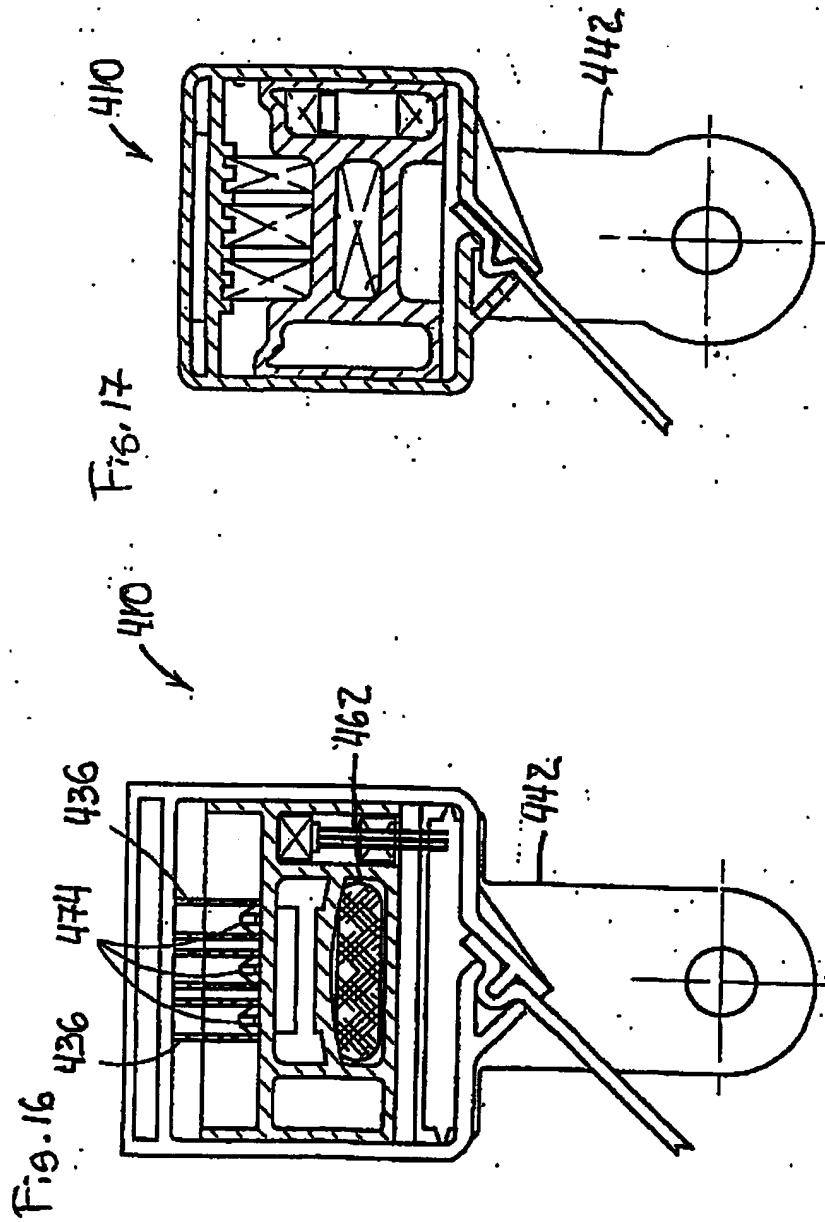


FIG. 15



13/17



(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization  
International Bureau



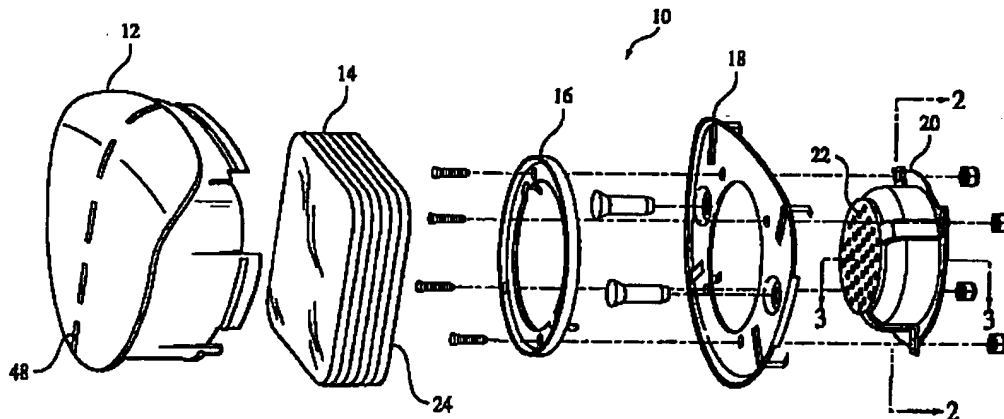
(43) International Publication Date  
23 May 2002 (23.05.2002)

PCT

(10) International Publication Number  
WO 02/40317 A2

- (51) International Patent Classification<sup>7</sup>: B60R (74) Agent: MARRA, Kathryn, A.; Delphi Technologies, Inc., P.O. Box 5052, Mail Code: 480-414-420, Troy, MI 48007-5052 (US).
- (21) International Application Number: PCT/US01/44076
- (22) International Filing Date: 6 November 2001 (06.11.2001) (81) Designated States (national): JP, KR.
- (25) Filing Language: English (84) Designated States (regional): European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR).
- (26) Publication Language: English
- (30) Priority Data: — Published:  
60/248,997 15 November 2000 (15.11.2000) US without international search report and to be republished upon receipt of that report  
09/949,702 10 September 2001 (10.09.2001) US
- (71) Applicant: DELPHI TECHNOLOGIES, INC. [US/US]; 5725 Delphi Drive, Troy, MI 48098-2815 (US).
- (72) Inventors: YOON, Joseph, Y.; 3212 Lexham Lane, Rochester Hills, MI 48309 (US). LITTLE, David, R.; 5420 Princeton Place, Kokomo, IN 46902 (US).
- For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: METHOD AND APPARATUS FOR DEPLOYMENT OF AN AIR BAG



(57) Abstract: A method and apparatus for controlling the deployment of a passive inflatable restraint system wherein driver and passenger air bags are employed each having two independently actuable gas generators of the same or different sizes which are activated in a fixed time sequence. The sequence is timed to provide an initial low inflation rate to just open the airbag container and initially deploy the airbag followed by a higher gas flow rate to complete filling of the cushion. An electronic control unit containing a control algorithm and connected to external sensors monitors vehicle decelerations, detects impacts, and determines if impact severity warrants deployment of an airbag for occupant protection. The external sensors include one or more sensors located in the forward portion of the vehicle to provide early impact detection and crash severity indications; a weight based occupant detection system located in the passenger seat to identify infants and small children and provide airbag suppression; and a seat belt mode or seat belt tension sensor to determine the presence of a cinched child seat and provide additional airbag suppression. The control algorithm monitors the above described sensors and if a deployment is required, a signal for activating the first initiator are provided, the second signal being delayed a predetermined time after the first signal is generated.